

DI
SUB E1

1 19. (Twice Amended) A method of manufacturing carbon fiber coils
2 each having a circular cross-section, comprising:
3 placing a solid catalyst within a reaction chamber;
4 supplying stock gas and a catalytic gas to the reaction chamber;
5 heating the reaction chamber to grow carbon fiber coils from the stock gas by a
6 burner or a heating chamber in which a heated fluid flows.

D2

1 22. (Twice Amended) The method of claim 21 including setting the
2 position of the solid catalyst and the velocity of the stock gas, wherein the ratio of the
3 velocity of the stock gas to a distance between an outlet of the port and the solid catalyst
4 is set in a range of 10 to 10000, wherein the velocity is expressed in centimeters per
5 minute and the distance is expressed in centimeters.

SUB E3
D3

1 26. (Twice Amended) An apparatus for manufacturing carbon fiber
2 coils each having a circular cross-section from a stock gas, which is subjected to thermal
3 decomposition to generate solid carbon, and a catalytic gas, which promotes thermal
4 decomposition of the stock gas, the apparatus comprising:
5 a reaction chamber, to which the stock gas and the catalytic gas are
6 supplied through a port;
7 a solid catalyst located within the reaction chamber; and
8 a burner for heating the reaction chamber to grow carbon fiber coils from the
9 stock gas.

1 27. (Twice Amended) The apparatus according to claim 26, wherein
2 the solid catalyst faces an outlet of the port and is spaced from the outlet by a distance,
3 and the stock gas is supplied to the reaction chamber at a certain velocity, wherein the
4 ratio of the velocity of the stock gas to the distance is in a range of 10 to 10000, wherein
5 the velocity is expressed in centimeters per minute and the distance is expressed in
6 centimeters.

D4

1 37. (Amended) A method of manufacturing carbon fiber coils each
2 having a circular cross-section, comprising:
3 placing a solid catalyst within a reaction chamber, wherein the solid
4 catalyst is spaced apart from an outlet of a gas supplying port of the reaction chamber at a
5 predetermined distance;
6 supplying a stock gas and a catalytic gas to the reaction chamber, wherein
7 the stock gas is supplied through the gas supplying port at a predetermined velocity,
8 wherein the ratio of the velocity to the distance is set in the range of 10 to 10000, wherein
9 the velocity is expressed in centimeters per minute and the distance is expressed in
10 centimeters;
11 applying a DC voltage to the solid catalyst to negatively charge the solid
12 catalyst; and
13 heating the reaction chamber to a temperature in a range of 700 to 830
14 degrees Centigrade to grow carbon fiber coils from the stock gas using a burner.

D5

1 38. (New) A method of manufacturing carbon fiber coils each having
2 a circular cross-section, comprising:
3 placing a solid catalyst within a reaction chamber, wherein the solid
4 catalyst is spaced apart from an outlet of a gas supplying port of the reaction chamber at a
5 predetermined distance;
6 supplying a stock gas and a catalytic gas to the reaction chamber, wherein
7 the stock gas is supplied through the gas supplying port at a predetermined velocity,
8 wherein the ratio of the velocity to the distance is set in the range of 10 to 10000, wherein
9 the velocity is expressed in centimeters per minute and the distance is expressed in
10 centimeters;
11 applying a DC voltage to the solid catalyst to negatively charge the solid
12 catalyst; and
13 heating the reaction chamber to a temperature in a range of 700 to 830
14 degrees Centigrade to grow carbon fiber coils from the stock gas using a heating chamber

15 surrounding the periphery of the reaction chamber, and wherein a heated fluid is
16 delivered to a space between the periphery of the reaction chamber and the heating
17 chamber.

39. (New) An apparatus for manufacturing carbon fiber coils each
having a circular cross-section from a stock gas, which is subjected to thermal
decomposition to generate solid carbon, and a catalytic gas, which promotes thermal
decomposition of the stock gas, the apparatus comprising:
a reaction chamber, to which the stock gas and the catalytic gas are
supplied through a port;
a solid catalyst located within the reaction chamber; and
a heating chamber surrounding the periphery of the reaction chamber, for
heating the reaction chamber to grow carbon fiber coils from the stock gas, wherein a
heated fluid is delivered to a space between the periphery of the reaction chamber and the
heating chamber.

40. (New) The apparatus according to claim 39, wherein the solid
catalyst faces an outlet of the port and is spaced from the outlet by a distance, and the
stock gas is supplied to the reaction chamber at a certain velocity, wherein the ratio of the
velocity of the stock gas to the distance is in the range of 10 to 10000, wherein the
velocity is expressed in centimeters per minute and the distance is expressed in
centimeters

REMARKS

Upon entry of the foregoing amendments, claims 19-32 and 35-40 are
pending in the present application.

Claims 19-25 and 35-37 stand rejected under 35 U.S.C. § 112, first and
second paragraphs.

Claims 19-22 and 25-34 stand rejected under 35 U.S.C. § 103(a) as being
unpatentable over UK Patent Application No. 2,244,230.